

We claim:

1. A knee brace mountable about a knee having a patella to maintain proper tracking of the patella during movement of the knee, said brace comprising:

an upper arm and a lower arm positionable about the knee;

5 a hinge assembly positioned between said upper arm and said lower arm and positionable at the knee to one side of the patella, said hinge assembly having a hinge pivot and a tension strap lever including a tension strap connection point, wherein said upper arm, said lower arm and said tension strap lever are each rotatable about said hinge pivot to transition between a flexion position and an extension position;

10 a tension strap connected to said tension strap lever at said tension strap connection point;

a compression member positionable on the opposite side of the patella from said hinge assembly, said tension strap engaging said compression member to apply a tension force to said compression member, wherein said tension force increases when 15 said tension strap lever rotationally transitions from said flexion position to said extension position and decreases when said tension strap lever rotationally transitions from said extension position to said flexion position; and

means for applying a counter force to said compression member opposing said tension force.

20 2. The brace of claim 1 wherein said hinge assembly includes a lower end of said upper arm and an upper end of said lower arm and said hinge pivot includes an upper pivot element and a lower pivot element, wherein said lower end is rotatable about said upper pivot element, said upper end is rotatable about said lower pivot element and said tension strap lever is rotatable about said upper pivot element or said 25 lower pivot element.

3. The brace of claim 1 wherein said hinge assembly further comprises a tension strap connector connecting said tension strap to said tension strap connection point of said tension strap lever.

4. The brace of claim 1 wherein said counter force applying means is a 30 counterbalance connector connected to said tension strap.

5. The brace of claim 1 wherein said compression member comprises a tracking guide engaging the knee and a compression plate in overlying engagement with said tracking guide.

6. The brace of claim 5 wherein said compression plate is formed from a
5 more rigid material than said tracking guide and said tension strap engages said compression plate.

7. The brace of claim 1 wherein said compression member comprises a tracking guide engaging the knee.

8. The brace of claim 1 wherein said tension strap is an upper tension strap
10 and said tension strap lever is an upper tension strap lever, said brace further comprising a lower tension strap and a lower tension strap connection point, wherein said lower tension strap is connected to said lower tension strap at said lower tension strap connection point and engages said compression member.

9. The brace of claim 1 wherein said upper arm is a first upper arm, said
15 lower arm is a first lower arm and said hinge assembly is a first hinge assembly, said brace further comprising a second upper arm and a second lower arm and a second hinge assembly positioned between said second upper arm and said second lower arm and positionable at the knee to the opposite side of the patella from said first hinge assembly.

20 10. The brace of claim 1 further comprising a stiffened upper cuff retaining said upper arm and a stiffened lower cuff retaining said lower arm.

11. A brace mountable about a knee having a patella to maintain proper tracking of the patella during movement of the knee, said brace comprising:

an upper arm and a lower arm positionable about the knee;

25 a hinge assembly positioned between said upper arm and said lower arm and positionable at the knee to one side of the patella, said hinge assembly having an upper pivot element, a lower pivot element, an upper tension strap lever including an upper tension strap connection point, and a lower tension strap connection point, wherein said upper arm is rotatable about said upper pivot element and said lower arm and said upper tension strap lever are rotatable about said lower pivot element to

transition between a flexion position and an extension position;

an upper tension strap connected to said upper tension strap lever at said upper tension strap connection point;

5 a lower tension strap connected to said hinge assembly at said lower tension strap connection point;

a compression member positionable on the opposite side of the patella from said hinge assembly, said upper and lower tension straps engaging said compression member to apply a tension force to said compression member, wherein said tension force increases when said upper tension strap lever rotationally transitions from said 10 flexion position to said extension position and said tension force decreases when said upper tension strap lever rotationally transitions from said extension position to said flexion position; and

means for applying a counter force to said compression member opposing said tension force.

15 12. The brace of claim 11 wherein said hinge assembly further comprises an upper tension strap connector connecting said upper tension strap to said upper tension strap connection point of said upper tension strap lever.

13. The brace of claim 11 wherein said hinge assembly further comprises a lower tension strap connector connecting said lower tension strap to said lower tension 20 strap connection point.

14. The brace of claim 11 wherein said compression member comprises a tracking guide engaging the knee.

15. The brace of claim 11 wherein said upper arm is a first upper arm, said lower arm is a first lower arm and said hinge assembly is a first hinge assembly, said 25 brace further comprising a second upper arm and a second lower arm and a second hinge assembly positioned between said second upper arm and said second lower arm and positionable at the knee to the opposite side of the patella from said first hinge assembly.

16. The brace of claim 15 wherein said counter force applying means is said 30 upper tension strap extending between said compression member and said second

hinge assembly.

17. An brace mountable about a knee having a patella to maintain proper tracking of the patella during movement of the knee, said brace comprising:

an upper arm and a lower arm positionable about the knee;

5 a hinge assembly positioned between said upper arm and said lower arm and positionable at the knee to one side of the patella, said hinge assembly having a hinge pivot and a tension strap lever including a tension strap connection point, wherein said upper arm, said lower arm and said tension strap lever are each rotatable about said hinge pivot to transition between a flexion position and an extension position;

10 a tension strap connected to said tension strap lever at said tension strap connection point;

a compression member positionable on the opposite side of the patella from said hinge assembly, said tension strap engaging said compression member to apply a tension force to said compression member, wherein said tension strap connection point

15 is posteriorly displaced more distal from the patella when said tension strap lever rotationally transitions from said flexion position to said extension position and said tension strap connection point is anteriorly displaced more proximal to the patella when said tension strap lever rotationally transitions from said extension position to said flexion position; and

20 means for applying a counter force to said compression member opposing said tension force.

18. A brace mountable about a knee having a patella to maintain proper tracking of the patella during movement of the knee, said brace comprising:

an upper arm and a lower arm positionable about the knee;

25 a hinge assembly positioned between said upper arm and said lower arm and positionable at the knee to one side of the patella, said hinge assembly comprising,

a lower end of said upper arm,

an upper end of said lower arm,

an upper pivot element,

30 a lower pivot element,

5 a tension strap lever including a tension strap connection point, wherein said lower end of said upper arm is rotatable about said upper pivot element, said upper end of said lower arm is rotatable about said lower pivot element, and said tension strap lever is rotatable about said upper or lower pivot element in a first direction or a second direction, and

a drive bushing connecting said upper or said lower arm with said tension strap lever, wherein said drive bushing displaces said tension strap lever in response to rotation of said upper and lower arms;

10 a tension strap connected to said tension strap lever at said tension strap connection point;

15 a compression member positionable on the opposite side of the patella from said hinge assembly, said tension strap engaging said compression member to apply a tension force to said compression member, wherein said tension force increases when said first direction is anterior and said second direction is posterior and said tension force decreases when said first direction is posterior and said second direction is anterior; and

means for applying a counter force to said compression member opposing said tension force.

19. A method for maintaining proper patellar tracking during range of motion 20 movement of a knee comprising:

positioning a compression member to a first side of a patella of a knee, wherein said compression member is aligned with a desired dynamic patellar track;

25 positioning a hinge assembly at said knee to a second side of said patella essentially opposite said first side, said hinge assembly providing rotation between an upper arm and a lower arm and said hinge assembly having a hinge pivot and a tension strap lever including a tension strap connection point, wherein said upper arm, said lower arm and said tension strap lever are each rotatable about said hinge pivot to transition between a flexion position and an extension position;

30 engaging a tension strap with said compression member and said tension strap lever at said tension strap connection point;

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performing a range of motion movement on said knee by moving said knee from said flexion position to said extension position or from said extension position to said flexion position;

5 posteriorly displacing said tension strap connection point away from said patella to tighten said tension strap and increase said tension force when said knee approaches said extension position; and

anteriorly displacing said tension strap connection point toward said patella to slacken said tension strap and decrease said tension force when said knee approaches said flexion position.